



DRAFT TANZANIA STANDARD

Processed cultivated edible mushrooms – Specification

FOR STAKEHOLDER'S COMMENTS ONLY

FOR STAKEHOLDER'S COMMENTS ONLY

Processed cultivated edible mushrooms – Specification

0 Foreword

Tanzania edible mushroom farming is one of the growing agribusinesses, but, processing is limited to small scale operation and mainly confined to drying. Importation of mushroom is also growing. The value of mushroom is built on its ability to provide some protein, minerals, vitamins, fibre, carbohydrate and more on their flavour importing ability.

In view of the growing demand of mushrooms it has been necessary to prepare this standard in order to ensure the supply of safe and good quality mushrooms to the consumer..

This Tanzania Standard was developed in order to ensure the safety and quality of cultivated edible mushroom being produced or sold in Tanzania.

In the preparation of this Tanzania Standard assistance was derived from:

Codex standard No.39:1981 Dried edible fungi: published by the Codex Alimentarius Commission

Codex standard No.8:1981 General standard for edible fungi and fungi products: published by the Codex Alimentarius Commission

1 Scope

This Tanzania Standard prescribes requirements and methods of sampling and tests for processed cultivated edible mushroom species for export and local markets.

2 Normative References

For the purpose of this Tanzania Standard the following reference shall apply:

TZS 33: 2018, *Spices and condiments* sampling

TZS 59: 2010, *Water for analytical laboratory use – Specification and test method*

TZS 76:2010 *General method for determination of arsenic silver diethyldithiocarmate photometric method*

TZS 109: 2009, *General code of hygiene for food processing units*

Codex stan 192, *Food – Permitted food additives – Schedule*

TZS 118:2018(1st Ed) ISO 4833-1:2003 - Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of microorganisms- Part 2: Colony count at 30 degrees C by the pour plate technique

TZS 119:2018, Microbiology of food and animal feeding stuffs – Horizontal method for detection and enumeration of coliforms – Most probable number technique

TZS 122:2018 Microbiology of food and feeding stuffs – Horizontal method for the detection of salmonella spp

TZS 731:2018 Microbiology of food and feeding\stuffs – Horizontal method for the detection and enumeration of presumptive Escherichia Coli – Most Probable Number Technique

TZS 125-1:2018 Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase\positive staphylococci \ (Staphylococcus aureus and other species\) – Part 1\ : Technique using Baird\ -Parker agar medium – Amendment 1\ : Inclusion of precision data

TZS 163: 2012, Fruits and vegetables – Sampling

TZS 268:2017(2nd Ed) General atomic absorption spectrophotometric method for determination of lead in food and food stuffs

TZS 538:2015-EAS 38:2014 Labelling of pre\ -packaged foods — General requirements

TZS 729-2:2018 Microbiology of food and animal feeding stuffs –Horizontal method for the enumeration of coliforms – Colony count technique

AOAC 971.21:2000(17th Ed) Mercury in food flameless Atomic absorption method

3 Terms and definitions

For the purpose of this Tanzania Standard the following definitions shall apply:

3.1 Cultivated edible mushrooms

Fruit bodies of the fungi plant group which are grown under artificial conditions as opposed to those which grow naturally and are suitable for use as human food.

3.2 Processed mushrooms

Mushrooms are preserved in order to extend the shelf life i.e dried mushrooms (including freeze-dried mushrooms, mushroom grits, mushroom powder), pickled mushroom, salted mushroom, fermented mushrooms, mushrooms in plant oils, quick frozen mushrooms, sterilized mushrooms, mushroom extracts, mushroom concentrate, smoked mushroom, mushroom sausages and dried mushroom concentrate.

3.3 Dried mushrooms

Mushrooms obtained by drying of edible mushrooms of one species, either whole or sliced.

3.4 Freeze-dried mushrooms

Mushrooms preserved by freezing it rapidly and placed it in vacuum chamber where water frozen in the product evaporates through sublimation

3.5 Mushroom grits

Coarsely ground dried edible mushrooms of one species.

3.6 Mushroom powder

Dried edible mushroom of one species ground so finely as to allow the powder to pass through a sieve having a 200 micron mesh.

3.7 Pickled mushrooms

Fresh or previously preserved edible mushroom of one or more species appropriately prepared after previous cleaning, washing and blanching, soaked in vinegar and with or without the addition of salt, spices, sugars, plant oils, acetic, lactic, citric or ascorbic acid, and then pasteurized in hermetically sealed container.

3.8 Salted mushrooms

Fresh edible mushrooms of one species, either whole or sliced, preserved in brine after previous cleaning, washing and blanching.

3.9 Fermented mushrooms

Fresh edible mushrooms of one species preserved by salt and by lactic acid fermentation.

3.10 Quick frozen mushrooms

Fresh edible mushrooms of one species which, after cleaning, washing and blanching are subjected to a freezing process in appropriate equipment and comply with the conditions laid down hereafter in this section and in clause 4.9.4 of this Tanzania Standard. This freezing operation shall be carried out in such a way that the range of temperature of maximum crystallization is passed quickly. The quick-freezing process shall not be regarded as complete unless and until the product temperature has reached -18°C (0°F) at the thermal centre after thermal stabilization.

3.11 Mushroom extract/concentrate

Products concentrated from fresh edible mushroom juice or from dried mushroom water of edible mushroom of one or more species with the addition of salt and which is concentrated to 7% salt less extract.

3.12 Dried mushroom concentrate

The dried product obtained from mushroom extract or mushroom concentrate.

3.13 Sterilized mushroom

Edible mushroom, fresh, salted or frozen, of one or more species, whole or sliced, packed in air tight containers in water and salt, and heat treated to a degree guaranteeing the resistance of the product to spoilage.

3.14 Mushroom in olive oil and other plant oils

Edible mushrooms either fresh or previously salted, of one species, whole or sliced, packed in airtight containers in olive oil or other plant oil and heat treated to a degree guaranteeing the resistance of the product to spoilage.

3.15 Whole dried mushroom

The product obtained from whole cleaned and dried edible mushrooms. Their stalks may be shortened.

3.16 Whole caps without stems

The product obtained from whole caps with their stems having been removed.

3.17 Cut dried mushrooms

Mushrooms obtained from whole edible mushrooms sliced and dried; the thickness of the individual slices being 1-4 mm.

3.18 Mushroom sausage

mushroom sausages as fresh or previously preserved edible mushrooms of one or more species appropriately prepared after previous cleaning, washing and cooking after addition of salt, spices, plant oils, assorted plants, acetic, lactic, citric or ascorbic acid and then filled in artificial or other membrane cases.

3.19 Damaged mushroom

Mushroom with more than quarter of the cap missing.

3.20 Crushed mushroom

Parts of mushroom passing through sieve having 5 x 5 mm mesh for dried mushroom.

3.21 Carbonized mushrooms

Whole or dried mushrooms with traces of carbonization on their surface.

3.22 Maggot damaged mushrooms

Mushrooms having holes caused by maggots.

3.23 Seriously maggot damaged mushrooms

Mushrooms having four or more holes caused by maggots.

3.24 Fallen off stalks

Stalks separated from the caps.

3.25 Organic impurities of plant origin

Admixture of other edible mushrooms, parts of plants such as leaves and other tree stalks.

3.26 Mineral impurities

Those substances which after ashing, remain as insoluble residues in concentrated hydrochloric acid.

3.27 Insect damaged mushrooms

Mushroom that have holes caused by maggots and other insects.

3.28 Spoiled mushrooms

Mushrooms which are brownish or rotten as a result of attack by mould and other micro-organisms.

4 Requirements

4.1 General requirements

Processed mushrooms shall include a wide range of products specified under sub clause 3.2; and their form being described as provided under their definition in clause 3.

4.1.1 Raw materials

Only fresh edible mushrooms which have been treated or processed immediately after they have been picked before deterioration sets in shall be used in the preparation of processed mushrooms. Both the raw and preserved mushroom shall be healthy clean, undamaged, free as

practicable of maggots and other insect damages and shall possess the flavour and taste characteristic to the species.

4.1.2 Mushroom products may contain salt (sodium chloride), vinegar, spices and herbs, sugars, refined edible plant oil, butter, milk, milk powder, cream water and wine.

4.1.3 All processed edible mushrooms shall be safe and of good quality which shall not only be limited to the following species:

- a) White mushrooms or common mushrooms and brown mushrooms (*Portabellas and criminis*) of the *Agaricus spp*)
- b) Shiitake mushrooms (*Lentinula edodes*)
- c) Oyster mushrooms (*Pleurotus ostreatus*)
- d) Enoki mushrooms (*Flammulina velutipes*)
- e) Maitake mushrooms (*Grifola frondosa*)
- f) Beech mushrooms (*Hypsizygos tesellatus*)

4.1.4 For all categories of mushrooms described in 4.1, shall in all cases be free from toxic ingredients; and shall not be a mixture of more than one species, unless clearly labeled as specified in clause 9.2.1(a).

4.1.5 All mushrooms that are to be harvested, marketed or preserved or to be used in the preparation of mushroom products shall be carefully examined by an expert to determine whether there are any inedible mushrooms amongst them.

4.1.6 Mushrooms Styles

Processed mushrooms may be presented in various styles, e.g whole with stalks, whole caps (buttons) without stalks, slices, pieces and stalks, grits, powder or concentrate.

4.1.7 Other mushrooms styles

Any other presentation of the product shall be permitted provided that the product is sufficiently distinctive from other forms of presentations described in this standard and meet the requirements of this standard. Also such product shall be adequately described on the label to avoid confusing or misleading the consumer.

4.1.8 Composition

Except in the case processed mushrooms consisting entirely of caps or where the addition of stalks is stated on the label as provided under 9.2.a (i) the number of stalks shall not exceed the number of caps.

4.2 Specific requirements

4.2.1 Dried mushrooms

Dried mushrooms shall be clean, undamaged, and free as practicable from extraneous matter, maggot and other pest damages.

AFDC12 (5984) P3TZS 1583: 2013

The chemical and physical requirements for the dried mushrooms when determined as per TZS 33 (see clause 2) shall be as given in table 1.

Table 1 – Chemical and physical requirements for dried mushrooms

Type of processed mushroom	Requirements			
	Moisture % m/m, max.	Acid insoluble ash,% m/m, max.	Organic impurities of plant origin,% m/m ,max.*	Maggot and other pest damaged mushroom % m/m, max.*
Dried (other than freeze dried)	12	0.2	0.02	1.0
Freeze dried	6	0.2	0.02	1.0
Dried Shiitake (other than freeze dried)	13	0.2	1.0	1.0

NOTE: * Organic impurities, maggot and other pest damaged mushrooms shall be determined by normal count under normal vision of a naked eye or by magnifying lense of X10, if necessary.

4.2.2 Mushroom grits and mushroom powder

The chemical requirements for mushroom grits and mushroom powder when determined as per TZS 33 (see clause 2) shall be as given in table 2.

Table 2 – Chemical requirements for mushroom grits and mushroom powder

Type of processed Mushroom	Requirements	
	Moisture % m/m, max.	Acid insoluble ash % m/m, max.

Mushroom grits	13	0.2.0
Mushroom powder	9	0.2.0

4.2.3 Pickled and fermented mushrooms

The chemical and physical requirements for pickled and fermented mushrooms when determined as per TZS 33 (also see note) shall be as given in table 3.

Table 3 – Chemical and physical requirements for pickled and fermented mushrooms

Type of processed mushroom	Requirement					
	Salt (sodium chloride) % m/m	Sugar % m/m, max	Vinegar, (acetic acid) %, m/m	Acid insoluble ash % m/m, max	Organic impurities of plant origin % m/m, max*	Maggot and other pest damaged mushroom % m/m, max*
Pickled mushroom	≤ 2.5	2.5	2	0.1	0.02	1.0
Fermented mushrooms	3-6	-		0.2	0.1	1.0

NOTE: * Organic impurities, maggot and other pest damaged mushrooms shall be determined by normal count under normal vision of a naked eye or by magnifying lens of X10, if necessary.

4.2.3.1 The permitted ingredients in the case of pickled mushrooms are salt as sodium chloride, sugars, spices and vinegar.

4.2.3.2 The permitted ingredients in the case of fermented mushroom are salt as sodium chloride and lactic acid occurring naturally into the product as a result of fermentation lactic acid not to exceed 1 % m/m.

4.2.4 Quick frozen mushrooms and mushrooms in olive oil and other vegetable oil

The chemical and physical requirements for mushrooms in olive oil and other vegetable oils when determined as per TZS 33 (also see note) shall be as given in table 4.

Table 4 – Chemical and physical requirements for quick frozen mushrooms and mushrooms in olive oil and other plant oil.

AFDC12 (5984) P3TZS 1583: 2013

Type of processed mushroom	Salt as sodium chloride % m/m, max.	Acid insoluble ash % m/m, max.	Organic impurities of plant origin % m/m, max.*	Maggot and other pest damaged mushrooms % m/m, max.*
	Quick frozen mushroom in olive oil and other plant oils	- 1.0	0.2 0.1	0.02 0.02

NOTE: * Organic impurities, maggot and other pest damaged mushrooms shall be determined by normal count under normal vision of a naked eye or by magnifying lens of X10, if necessary.

4.2.5 Salted and sterilized mushrooms

The chemical and physical requirements for salted and sterilized mushrooms when determined as per TZS 33 (also see note) shall be as given in table 5.

Table 5 – Chemical and physical requirements for salted and sterilized mushrooms

Type of processed mushroom	Requirement			
	Salt as sodium chloride % m/m	Acid insoluble ash % m/m, max.	Organic impurities of plant origin % m/m, max.*	Maggot damage mushrooms % m/m, max.*
Salted mushrooms	15-18	0.3	0.03	1.0
Sterilized mushrooms	≤ 2	0.2	0.02	1.0

NOTE: * Organic impurities, maggot and other pest damaged mushrooms shall be determined by normal count under normal vision of naked eye or by magnifying lens of x10, if necessary

The only permitted ingredient for both salted and sterilized mushrooms is salt as sodium chloride.

4.2.6 Mushroom extract, Mushroom concentrated and dried mushroom concentrate

The chemical and physical requirements for mushroom extract, mushroom concentrate and dried mushroom concentrate when determined as per TZS 33 (also see note) shall be as given in table 6.

Table 6 – Chemical and physical requirements for mushroom extract, mushroom concentrate and dried mushroom concentrate

Type of processed mushroom	Requirements				
	Salt sodium chloride m/m, max.	as %	Acid insoluble ash, % m/m, max.	Organic impurities of plant origin % m/m, max.*	Moisture m/m, max* %
Mushroom extract and mushroom concentrate	20.0		NIL	NIL	-
Dried mushroom concentrate	5.0		NIL	NIL	9.0

NOTE: * Organic impurities shall be determined by normal count under normal vision of naked eye or by magnifying lens of x 10 if necessary.

The only permitted ingredient in mushroom extract, mushroom concentrate and dried mushroom concentrate is salt as sodium chloride.

5 Food additives

Other than food additives prescribed in Codex Stan 192 (see clause 2) the food additives listed in table 7 may be used in processed mushroom.

Table 7 – List of permitted food additives

Name of additive	Maximum level of use
Acetic and lactic acid	Limited by GMP or as provided in this Tanzania Standard
Citric and ascorbic acid	Limited by GMP or as provided in this Tanzania Standard for pickled and fermented mushrooms
Acetic acid	20 g/Kg in pickled mushroom
Lactic and citric acid	5 g/Kg singly or in combination in sterilized mushroom

6 Hygiene

6.1 Processed mushrooms shall be prepared and handled in accordance to the requirements prescribed in TZS 109 (see clause 2). To the extent possible in Good Manufacturing Practice, the product shall be free from objectionable matter.

6.2 The product on testing shall comply with the microbiological limits given in Table 8.

Table 8 – Microbiological limits

S/No.	Type of microorganisms	Limits	Method of test
1.	Total plate count, cfu/g max	1×10^3	TZS 118
2.	Coliforms, Cfu/g	Absent	TZS 119
3.	<i>Staphylococcus aureus</i> , cfu/25 g max	1×10^1	TZS 731
4.	Salmonella, cfu/25 g	Absent	TZS 122

6.3 Pre-requisite programmes such as Good Manufacturing Practices, Good Agriculture Practices and Good Hygienic Practice shall be established and implemented in order to limit the occurrence of parasite microorganisms and hazardous substances originating from them or other material which may pose a health hazard

6.4 Chemical contaminants

Processed mushrooms shall be free from pesticides, chemicals and heavy metal contaminants in amounts which may present a hazard to human health and as provided in Table 9 and as prescribed in relevant Codex Alimentarius Commission standard

6.5 Prevention of cross contamination

During primary production and post-harvest activities effective measures shall be taken to prevent cross contamination of the product.

Table 9 – Limits for metal contaminants

S/No.	Characteristic	Limits	Method of test refer to relevant standard (see clause 2)
1.	Arsenic, mg/kg, max.	0.2	TZS 76
2.	Lead mg/kg, max.	0.2	TZS 268
3.	Mercury	0.1	AOAC 971.21:2000(17 th Ed)

7 Sampling and test

7.1 The methods of sampling and tests shall be in accordance with the methods specified in TZS 163 and TZS 33 (see clause 2) and as provided in the respective tables of this Tanzania Standard.

8 Storage and transportation

8.1 The product shall be stored and transported at a temperature that will maintain the quality and safety up to and including the time of final sale.

8.2 In the case of dried mushrooms, mushroom grits and mushroom powders care shall be taken to prevent the products from absorbing moisture and being attacked by insects, particularly moths and mites.

9 Packaging, marking and labelling

9.1 Packing

Processed mushroom shall be packed in such a way as to protect against any damage or expose such that it can easily be attacked by pests or other kind of infestation or moisture ingress. The packaging material must preferably allow the consumer to view the produce. The packages must be free from any foreign matter, objectionable smell and shall be of food grade and recyclable.

9.2 Marking and labelling

In addition to the provisions covered under TZS 538 (see clause 2) processed mushrooms shall be legibly and indelibly marked on the label with the following information.

- a) The name of the product
 - i. The name of the product shall comply with the definitions and other requirements of this Tanzania Standard with a designation that shall indicate the true nature. The genus such as *Agaricus* shall be provided including its scientific name of the species. The method of processing to which the product has been subjected shall be included e.g. "dried, sterilized, salted, pickled, fermented".

ii. In the case of processed mushrooms consisting of more than one species, such fact as “mixed” shall form part of the designation; including the style as per clause 4.6.

- b) List of ingredients in descending order of proportion except for the dried mushrooms.
- c) Name, physical and postal address of the producer/packer or distributor.
- d) Country of origin, district and region
- e) Net mass in SI units
- f) Batch number in code or in clear
- g) Brand or trade mark, if any.
- h) Storage condition
- i) Instruction for use
- j) Date of production and expiry

9.3 Certification mark – Each container may also be marked with a TBS certification mark.

NOTE – The use of TBS certification mark of quality is governed by the provisions of the standards Act, 2009. Details of the conditions under which a license for use of the TBS certification mark of quality may be granted to manufacturers or producer may be obtained from TBS.

FOR STAKEHOLDERS COMMENTS ONLY